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(54) Twin-wire web former in a paper machine.

(57) The invention concerns a twin-wire web former in a paper machine, comprising a covering wire (10) and a carrying wire (20), which form a twin-wire forming zone (A-B) with one another. Into the forming gap (G), which is defined between said wires (10, 20), the discharge opening of the headbox (60) feeds a pulp suspension jet (J). The forming gap (G) is followed immediately by a forming shoe (12 ;22) provided with a curved guide deck (12a ;22a ;22'). After the forming shoe (12 ;22), before the first forming roll (24 ; 14A), a draining unit (50) or units (50A,50B) is/are provided, which unit/units comprise(s) a press/support unit (30), which guides the wire (10,20) placed in contact with it as a straight run. The draining unit (50) or units (50A,50B) comprise(s) a draining equipment (40) provided with suction and foil equipment and placed opposite to the press and support unit (30), which draining equipment (40) removes a substantial amount of water out of the web (W).

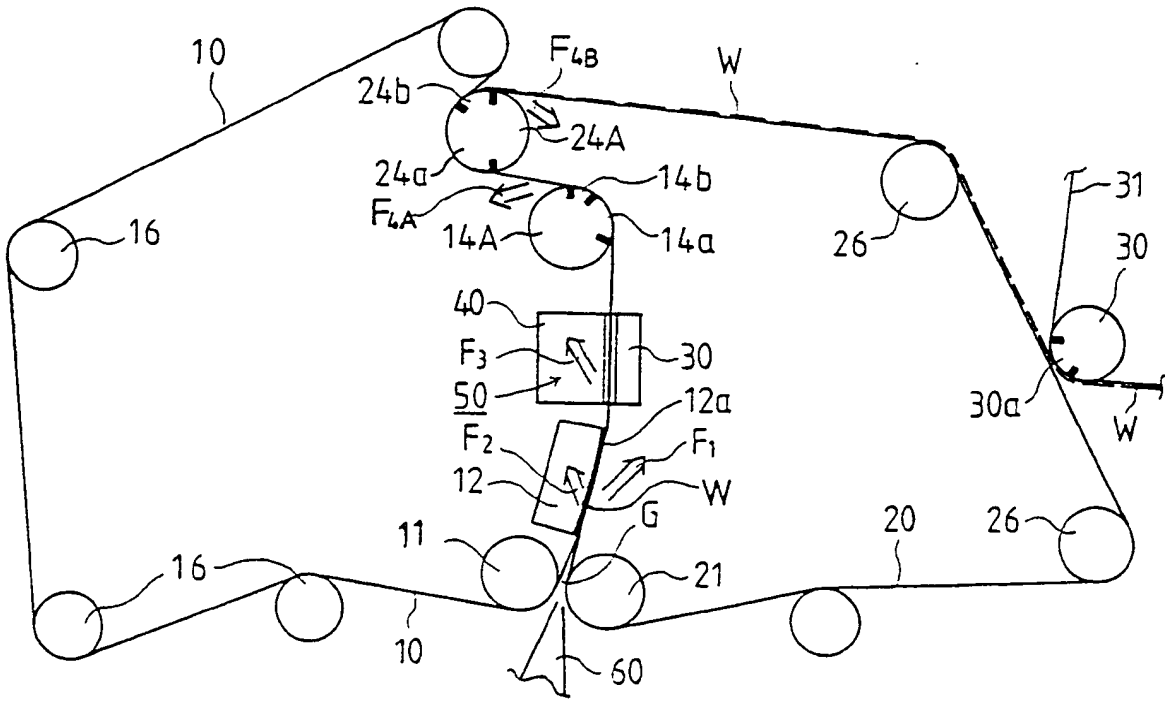

FIG. 2

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Th invention concerns a twin-wire web former in a paper machine, comprising a covering wire and a carrying wire, which form a twin-wire forming zone with one another, at th beginning of which forming zone there is a forming gap, which is defined betw en said wires guided by th breast rolls, and into which forming gap the discharge opening of the headbox feeds a pulp suspension jet, and which forming gap is followed, substantially immediately or after a relatively short straight joint run of the wires, by a forming shoe provided with a curved guide deck, after which there are at least two forming members, after the latter one of which the web is detached from the covering wire and passed on the carrying wire to the pick-up point.

During the last 20 years, various manufacturers have introduced a number of web formers operating by the twin-wire principle, a review of said formers being published, e.g., in the journal Pup & Paper, September 1982.

With increasing running speeds of paper machines, several problems in the web formation have been manifested with more emphasis. In the former of a paper machine, the phenomena that affect the fibre mesh and the water, which is still relatively free in connection with the fibre mesh, such as centrifugal forces, are, as a rule, increased in proportion to the second power of the web velocity. The highest web speeds of the present-day newsprint machines are of an order of 1200 m/min. However, newsprint machines are being planned in which a web speed of up to about 1700 m/min is aimed at.

In the applicant's FI Patent Application No. 904489 (filed September 12, 1990), a twin-wire web former is described in the area of whose forming gap there is a first forming roll, on which the twin-wire zone is curved within a certain sector, which is followed by plane dewatering units or unit. These units comprise a press-support unit, which guides the wire that enters into contact with said unit as a straight run, as well as a dewatering equipment placed facing the press and support unit and provided with a suction and foil equipment, said dewatering equipment removing a substantial amount of water out of the web. The magnitude of the twin-wire turning sector placed in connection with the first forming roll is in the range of 5°...120°, preferably within the range of 35°...55°. The object of the present invention is further development of the inventive ideas stated in said FI application and expansion of their field of application.

The invention is expressly concerned with gap formers in which the forming gap is defined between two breast rolls or equivalent turning members, such as turning bars, placed side by side, which breast rolls or equivalent do not operate as forming rolls, at least not to a substantial extent, and after which breast rolls the opposite wires that define the forming gap run as substantially straight runs, while approaching each other, onto the next forming member, which consists of a forming shoe provided with a curved guide deck.

In respect of the prior art related to the present invention, reference is made further to the US Patent 4,769,111 of A. Ahlstrom Corporation, to the applicant's FI Pat. Appl. No. 885609, as well as to the FI Patent Applications Nos. 885606 and 885607 of Valmet-Ahlstrom Inc., in which formers marketed under the trade mark "MB-Former" are described.

An object of the invention is to provide a twin-wire gap former whose dewatering capacity and efficiency can be increased as compared with the prior-art shoe-roll formers and with other, corresponding formers.

It is a particular object of the invention to achieve the objectives mentioned above especially with slowly draining pulps, such as SC-pulps. It is a further object to provide a gap former in which the increased dewatering capacity can be utilized as an increased web speed, especially in the case of fine papers, whose grammages are, as a rule, in the range of 50...200 g/m^2, while improving their formation.

In view of achieving the objectives stated above and those that will come out later, the invention is mainly characterized in that, after said forming shoe, before the first forming roll, a draining unit or units is/are provided, which unit/units comprise(s) a press/support unit, which guides the wire placed in contact with it as a substantially straight run, that said draining unit or units comprise(s) a draining equipment provided with suction and foil equipment and placed opposite to said press and support unit, which draining equipment removes a substantial amount of water out of the web.

In the invention, two prior-art wire parts have been combined in a novel way, i.e. a prior-art shoe-roll gap former and the above "MB-Former" (trade mark). By means of the MB-unit or units, a more intensive pulsating dewatering pressure can be applied to the pulp web, which pressure can be controlled and regulated better than in the prior art.

Owing to said MB-unit or units fitted and located in accordance with the invention, in the gap formers subject of the invention, th formation can b improved and the dewatering capacity be increased especially with slowly draining pulps, such as SC-pulps. Owing to th increased dewatering capacity, e.g. in th case of fine pap rs, it is possible to use higher spe ds at the same time as the formation is improved.

With th prior-art gap formers, the headbox flow rates used for fine pap r are lower than about 200 litres per s cond per m tre (l/s/m), and the machine speeds are low r than 1000 m/min with the grammage of 80 g/m^2. In formers in accordance with the present invention, it is possibl to increase the flow rat in th headbox and the machine speed, according to preliminary estimates, by about 10...30 % from the values given above.

Owing to the dewatering intensified by means of an MB-unit or units, the former in accordance with the invention is suitable for use in particular with fine papers, which are run with relatively high headbox flow rates and with low pulp consistencies.

In the invention, when the web arrives at the MB-unit, its dry solids content is, as a rule, of an order of 2 % .... 8 %.

Owing to the MB-unit or units fitted in accordance with the invention, the former in accordance with the invention is also suitable for use for relatively thick paper qualities as well as for boards and for pulps whose dewatering is more difficult than average.

In this connection, it should be emphasized that, in respect of its construction and operation, the MB-unit applied in the invention differs substantially from such forming members used in a corresponding position at which the twin-wire zone is curved with a large curve radius so that the wire that remains outside is free and dewatering of the web takes place to a substantial extent also through the outer wire by the effect of the tightening pressure of the web $p = T/R$ (T = tightening tension of outer wire per metre, R = curve radius of the forming member), said dewatering being aided by centrifugal forces.

The MB-unit employed in the invention is highly efficient in, in the web that is being formed, producing pressure pulses that disintegrate pulp flocks more efficiently than the pressure pulsation of prior-art forming shoes does.

In the following, the invention will be described in detail with reference to some exemplifying embodiments of the invention illustrated in the figures in the accompanying drawings, the invention being by no means strictly confined to the details of said embodiments.

Figure 1 is a schematic side view of an embodiment of the invention in which the twin-wire zone is vertical and the first forming roll is placed inside the loop of the carrying wire.

In a way corresponding to Fig. 1, Figure 2 shows an embodiment of the invention in which the initial part of the twin-wire forming zone is vertical and in which, in the final part of the twin-wire zone, two forming rolls are used which are placed one above the other and side by side.

Figure 3 shows such a horizontal version of the invention in which the forming shoe and the first forming roll are substantially in the same plane and the breast roll of the lower wire is a suction roll that is provided with a suction zone and with a perforated mantle.

Figure 4 shows an embodiment of the invention that is in the other respects similar to that shown in Fig. 3, except that the breast roll of the lower wire is a normal breast roll with a smooth and solid mantle which does not participate in dewatering.

Figure 5 shows such a version of the invention as is in the other respects similar to that shown in Fig. 4, except that it is provided with two MB-units placed one after the other and operating in opposite directions as compared with one another.

Figure 6 shows an embodiment of the invention in which the initial part of the twin-wire zone is substantially horizontal, followed by two forming rolls, which have relatively large diameters, which are placed one above the other, and which are provided with suction zones.

Figure 7 shows a preferred exemplifying embodiment of the MB-unit used in the invention.

The formers shown in Figs. 1 to 4 comprise a loop of the covering wire 10 and a loop of the carrying wire 20. The wires 10,20 have a joint run between the lines A and B (Fig. 1), which define the twin-wire forming zone in the former. The web W follows the carrying wire 20 after the twin-wire forming zone. The discharge part 60 of the headbox feeds the pulp jet J (Fig. 1) into the forming gap G defined by the wires 10 and 20, which gap is defined as determined by the relative positions of the breast rolls 11 and 21;21A.

The present invention is expressly concerned with a former in the area of whose forming gap G there is no forming member, such as a forming roll, that participates in the dewatering and web formation to a decisive and substantial extent. Thus, in the formers subject of the invention, the forming gap G is defined between the wires 10,20 guided by two, preferably solid-faced, breast rolls 11 and 21. After said breast rolls 11,21, the wires 10,20 have substantially straight runs that approach one another and that define the forming gap G. Immediately after the forming gap G or after a relatively short straight run of the wires 10,20, in the invention, there follows a forming shoe 12;22 provided with a curved (curve radius R) guide deck, said sho having a preferably open ribbed deck 12a;22a or, in an exceptional case, a solid deck 22', which is illustrated in Fig. 1. The curve radius R of the forming shoe 12; 22 is quite large, b ing usually in the range of R = 2.5...6.0 m. Owing to the curvature R of th forming shoe 12;22, wat r is drained to a substantial extent in the direction of the arrow F_1 through the outer wire 10;20 and also towards the forming shoe 12;22 in the direction of the arrow F_2 if said shoe has an open ribbed deck 12a;22a, possibly further aided by n gative pressure.

In Fig. 3, a version of the invention slightly different from th above is shown, in which the breast roll of the lower wire 20, which is at the same time the carrying wire, is a forming-breast roll 21A provided with an open mantle and possibly also with a narrow suction zone 21 a. The suction zone 21 a is placed in the area of the

forming gap G and, likewise in this embodiment, in the area of the roll 21A there is no significant twin-wire turning sector, and if there is a turning sector, the sector is quite short, as a rule in the range of 5°...20°.

As an important dewatering and support unit, the twin-wire formers shown in Figs. 1 to 6 include a MB-unit 50, two such units 50A and 50B being fitted one after the other in Fig. 5. The MB-unit 50 or units 50A and 50B comprise a dewatering equipment 40 and a press and support unit 30, between which the wires 10 and 20 and the pulp web W placed between them pass. In Fig. 5, the press and support unit 30 of the latter MB-unit 50B is placed above, so that it is a counter-unit and not a "support unit" proper. The press and support unit 30 included in the MB-unit 50, to be described in more detail later, guides the twin-wire zone as a straight run and presses it against the dewatering equipment 40. The dewatering towards the support unit 30 through the wire placed facing it is, as a rule, little, also in respect of dewatering taking place by the effect of the force of gravity. Thus, in connection with the MB-unit 50 or units 50A,50B, the dewatering takes place towards the equipment 40 provided with suction and foil equipment in the direction of the arrow F3 or the arrows F3A and F3B.

An exemplifying embodiment of the construction of the MB-units 50;50A and 50B will be described in more detail later with reference to Fig. 7.

As is shown in Figs. 1 and 3 to 5, after the MB-unit 50 or units 50A,50B, there is the first forming roll 24 placed inside the loop of the carrying wire 20, in the area of which roll 24 the run of the wires 10,20 is turned to curve towards the pick-up point (Fig. 1) or downwards (Figs. 3 to 5). After the first forming roll 24, the web W proceeds to the line P (Fig. 1), at which it is detached from the carrying wire 20 by means of the pick-up roll 30 and its suction zone 30a, being transferred onto the pick-up fabric 31, which carries the web W further to the press section of the paper machine (not shown).

According to Fig. 1, in the first forming roll 24, which is placed inside the loop of the carrying wire 20 and which is provided with a mantle 24' with through perforations, there are two suction zones 24a,24b placed one after the other. The latter zone 24b ensures that the web W follows the carrying wire 20, and the covering wire 10 is separated from the web W by means of the guide roll 16a.

In Fig. 2, after the MB-unit 50, there are two subsequent forming rolls. The first forming roll 14A is placed inside the loop of the covering wire 10 and is provided with two subsequent suction zones 14a,14b. The latter forming roll 24A is placed inside the loop of the carrying wire 20 and is provided with two suction zones 24a and 24b placed one after the other, the latter one of said suction zones 24b ensuring that the web W is separated from the wire 10 and follows the carrying wire 20.

In Figs. 3, 4 and 5, there is a first forming roll 24 provided with a suction zone 24a, which roll 24 is placed inside the loop of the lower wire 20, which is, at the same time, the carrying wire. In the area of the forming roll 24, the horizontal run of the wires is turned downwards over about 40...70°, whereupon the twin-wire zone is turned to a substantially horizontal level by means of a guide and/or forming roll 14 placed inside the loop of the covering wire 10. After this, the web W follows the substantially straight run of the carrying wire 20, and the covering wire 10 is separated from it.

Fig. 6 shows such a horizontal version of the invention in which the twin-wire forming zone, which starts after the forming gap G, has a substantially horizontal initial part. Inside the loop of the carrying wire 20, there is a forming shoe 22, which has an open ribbed deck 22a, through which an effect of negative pressure is applied through the wire 20 to the fibre web W that is being formed. The forming shoe 22 is followed by the MB-unit 50, in which there is the dewatering equipment 40 inside the loop of the covering wire 10 and the press and support unit 30 inside the carrying wire 20. After the MB-unit 50, the twin-wire zone has a short horizontal joint run, after which said zone is guided and turned upwards by a first forming-suction roll 14A placed inside the loop of the covering wire 10, on whose suction zone 14a the run of the wires 10,20 is turned over an angle of more than 90° as upwards inclined onto the second forming-suction roll 24A, on whose suction zone 24a the joint run of the wires 10,20 is turned into a substantially downwards inclined run. At the beginning of this run, the covering wire 10 is detached from the web W, which follows the run of the covering wire 20 to the pick-up point, at which the web W is transferred onto the pick-up fabric 31 on the suction zone 30a of the pick-up roll 30. The forming-suction rolls 14A and 24A are placed one above the other, and this pair of rolls 14A,24A operates, in view of the dewatering and the formation of the web W, in a way substantially equivalent to the first forming roll 24 described above.

Fig. 7 illustrates a MB-unit 50, which is included in the formers as shown in Figs. 1 to 6 and which comprises a dewatering equipment 40 as well as a plane wire press and support unit 30 jointly operative with said dewatering equipment.

According to Fig. 7, the dewatering equipment 40 consists of an integrated combination of, as a rule, two to four (in the figures, three) suction and water collecting chambers 46,47,48, in which combination the different chambers are separated from one another by partition walls 47b and 48b. In each chamber 46,47,48, there is an air opening (not shown) that communicates with a suction source and an outlet water duct 49. The water collecting duct 46a, which belongs to the first suction chamber 46, is formed between the beam 46b and the

guide plate 46c. At the lower end of the duct 46a, there is a transverse foil doctor 51 and a rib 52 which can be set by means of adjusting spindles 53, said doctor 51 and rib 52 forming a gap E, which extends across the width of the former and which can b regulated locally and through which the water pressed out of the pulp layer W placed between the wires 10 and 20 flows into the first chamber 46.

The foil doctor 51 in the equipment 40 shown in Fig. 7 is followed by a number of similar foils 51' and 51", whose lower faces are at the same level. The foils 51' collect the water that is separated from the fibre mesh in the area of the first suction chamber 46, but underneath said chamber, which water is passed into the suction chamber 47 through the duct 47a, which is formed between the partition wall 47b and the guide plate 47c. In a corresponding way, the water collected by the next foils 51" is passed into the third suction chamber 48 through the duct 48a, which is formed between the rear wall 48d of the dewatering device and the guide plate 48c.

The duct 46a shown in Fig. 7 and the related foil doctor 51 and the regulating rib 52 form a suction-aided dewatering member. When relatively thick qualities are produced by means of the former at low speeds, the operation of the autosclice system should be aided preferably by means suction while the vacuum is preferably 6...8 kPa. At this stage, the amount of dewatering directed upwards and partly also the magnitude of the vacuum that is produced can be affected by regulating the height of the gap E between the rib 52 and the foils 51.

In Fig. 7, the dewatering effect of the suction-aided dewatering member and of the related first suction chamber 46 is local, being limited to the proximity of the tip of the first foil doctor 51. The dewatering area of the second suction chamber 47 is wider, being determined by the number of the foils 51', which number is shown to be seven as an example case in Fig. 7. The effect of the foils 51' is based on joint operation with the wire support equipment 30 placed inside the lower-wire loop 20.

It is an essential feature of the press and support unit 30 and of its operation that, by its means, in the area of the dewatering equipment 40, it is in the desired way possible to provide a successively increasing compression by the lower wire 20 applied to the web W that is being formed, by the effect of which compression the dewatering of the web W takes place primarily through the upper-wire loop 10 into the suction duct 47a and through it into the suction chamber 47. The operation of the third suction chamber 48 is analogous to the second suction chamber 47.

The negative pressure that prevails in the second and the third chamber 47,48 shown in Fig. 7 is preferably considerably higher than that in the first chamber, i.e. about 10...20 kPa in the chamber 47 and about 15...30 kPa in the chamber 48, depending on the web material that is being produced. The beam members 31 of the press and support equipment 30 are supported on longitudinal support beams 33 by the intermediate of rubber hoses 32 pressurized with air, which support beams 33 are again supported by transverse box beams 34. The pressure effective in the hoses 32 can be regulated so that the load of the members against the lower wire 20 and the fibre mesh increases gradually in the running direction of the wires 10,20. In the hoses 32, quite a low pressure is used, for example 10...50 cm H_2O, in which case a very gentle compression is applied to the web W that is in the stage of formation, and the dewatering pressure is self-adjusted. The face of the members in the equipment 30 is provided with transverse grooves 35 extending across the entire width of the wire 20, which grooves also permit slight dewatering through the lower wire 20, and whereby microturbulence that improves the formation of the web W is produced.

In Fig. 7, the dewatering process goes on in the area between the line of incidence of the upper face of the web and the profile bar 52, where a water layer is formed on the inner face of the upper wire 10, which layer is gathered in the wedge-shaped space between the wire 10 and the profile bar 52 and in the subsequent gap E between the profile bar 52 and the foil rib, through which gap E the water is forced through the duct 46a into the first chamber 46 in the dewatering equipment, either by the effect of its kinetic energy and/or by the effect of the vacuum present in the chamber. The bar 52 can be positioned in the vertical direction by means of regulation devices 53, whereby it is possible to regulate the amount of water and possibly also the amount of air that enters into the duct 46a. Said adjustments both in respect of the angle d of incidence between the wires 10 and 20 and of the gap that passes into the duct 46a and in respect of the pressure applied to the support system, of course, depend on the paper or board quality that is produced.

In some cases, the suction-aided syst m based on the us of a profile bar and shown in Fig. 7 can be substituted for by a construction in which the profile bar 52 is replaced by a roll, whos sp ed of rotation and height position, i.e. distance from the wir 10, are arranged adjustable.

It is a feature typical of the MB-units 50;50A shown in Figs. 3 to 6 that the press and support unit 30 is placed underneath and the dewatering equipment 40 that compris s a suction and foil equipment is placed above, in which case the unit 30 substantially prevents dewatering of the web taking place by the force of gravity downwards through the carrying wire. In Fig. 5, the first MB-unit 50A complies with the above feature, whereas the latter MB-unit 50B has been arranged to operate in the opposite direction.

In accordance with the denotations made into Fig. 4, after th dewatering stages (arrows F_1 and F_2) taking

place on the forming shoe 22, the dry solids content k_1 of the web before the MB-unit is, as a rule, k_1 = in the range of 2...8 %. After the MB-unit 50, the dry solids content k_2 of the web is as a rule in the range of k_2 = 7...13 %, and at the end of the twin-wire zone the dry solids content k_3 of the web is, as a rule, in the range of k_3 = 10...16 %.

An example of a paper manufactured in accordance with the invention is fine paper whose grammage is 80 g/m². In such a case, it is possible to use headbox flow rates of 200...260 l/s/m and a web speed of 1000...1300 m/min.

In the following Table A, the dewatering proportions in the twin-wire zones in the different embodiments shown in Figs. 1 to 4 are shown, which proportions are, in the figures and in Table A, denoted with the references F1, F2, F3, F3A, F3B, F4, F4A, F4B. The dewatering proportions given in Table A are average values, and they may vary within certain limits depending on the paper quality, other operating parameters, and dimensioning details.

TABLE A

% Fig.	F0	F1	F2	F3	F3A	F3B	F4	F4A	F4B	F5
FIG. 1	-	35	15	40	-	-	-	4	3	1
FIG. 2	-	35	15	38	-	-	-	9	1	-
FIG. 3	25	30	15	23	-	-	4	-	-	1
FIG. 4	-	30	20	35	-	-	11	-	-	2
FIG. 5	-	30	15	-	25	25	2	-	-	1
FIG. 6	-	35	15	38	-	-	-	9	1	-

By means of the MB-unit 50 or units 50A,50B, a pulsating and sufficiently strong dewatering pressure is achieved which disintegrates pulp flocks efficiently. The dewatering effect of the MB-unit 50 or units 50A and 50B can also be regulated better than in prior art.

It is typical of the MB-nit 50 or units 50A,50B that the wires 10,20 and the web W placed between the wires run through said units as a straight run, which provides the advantage that the wire 10,20 speeds can be equal, in which case, at this stage, when the dry solids content is already of an order of 2...8 %, an internal working arising from the difference in the wire speeds is no longer produced in the web, which working is typical, e.g., of the preceding forming shoe 22.

The former in accordance with the invention is suitable for use at relatively high web speeds, which are, as a rule, in the range of 1000...1700 m/min and primarily for qualities thicker than newsprint, 50...200 g/m², from which good formation is required. Typical applications of the invention include gap formers operating in said speed range and used for the manufacture of fine paper or equivalent also out of slowly draining pulps, such as SC-pulps, at quite high headbox flow rates, which are typically in the range of 200...250 l/s/m.

In the following, the patent claims will be given, and the various details of the invention may show variation within the scope of the inventive idea defined in said claims and differ from what has been stated above for the sake of example only.

Claims

1. Twin-wire web former in a paper machine, comprising a covering wire (10) and a carrying wire (20), which form a twin-wire forming zone (A-B) with one another, at the beginning of which forming zone there is a

forming gap (G), which is defined between said wires (10,20) guided by the breast rolls (11,21;21A), and into which forming gap (G) the discharge opening of the headbox (60) feeds a pulp suspension jet (J), and which forming gap (G) is followed, substantially immediately or after a relatively short straight joint run of the wires (10,20), by a forming shoe (12;22) provided with a curved guide deck (12a;22a;22'), after which there are at least two forming members, after the latter one of which the web (W) is detached from the covering wire (10) and passed on the carrying wire (20) to the pick-up point, **characterized** in that, after said forming shoe (12;22), before the first forming roll (24;14A), a draining unit (50) or units (50A,50B) is/are provided, which unit/units comprise(s) a press/support unit (30), which guides the wire (10,20) placed in contact with it as a substantially straight run, that said draining unit (50) or units (50A,50B) comprise(s) a draining equipment (40) provided with suction and foil equipment and placed opposite to said press and support unit (30), which draining equipment (40) removes a substantial amount of water out of the web (W).

2. Web former as claimed in claim 1, **characterized** in that said forming shoe (12;22) includes a guide deck provided with an open guide deck (12a;22a) and that in the interior of said forming shoe (12;22), negative pressure is used so that, in the area of the forming shoe (12;22), water is removed through both wires (10,20).

3. Web former as claimed in claim 1 or 2, **characterized** in that the draining unit (50) which is fitted between said forming shoe (12;22) provided with a curved (R) guide deck (12a;22a,22') and the first forming roll (24;14A,24A) and through which the twin-wire zone runs as a straight run is arranged in such a way that its press and support unit (30) is placed underneath and inside the loop of the carrying wire (20) and that its draining equipment (40) is placed above and inside the loop of the covering wire (10).

4. Web former as claimed in any of the claims 1 to 3, **characterized** in that the proportion of the dewatering that takes place in the draining unit (50) or pair of draining units (50A,50B) placed after the forming shoe (12;22) out of the total dewatering that takes place in the twin-wire zone (A-B) is in the range of 5...50 %.

5. Web former as claimed in any of the claims 1 to 4, **characterized** in that the former includes two subsequent draining units (50A,50B) as arranged in such a way that the press and support unit (30) in the first unit (50A) is placed underneath and inside the loop of the carrying wire (20), whereas the second unit (50B) is arranged to operate in the opposite direction so that its press and support unit (30) is placed inside the loop of the covering wire (10) and the draining equipment (40) inside the loop of the carrying wire (20) (Fig. 5).

6. Web former as claimed in any of the claims 1 to 5, **characterized** in that the forming shoe (22) and the first forming roll (21,24) are placed substantially at the same level and between them there is a substantially horizontal joint run of the wires (10,20), on which said draining unit (50) is fitted, in which the press and support unit (30) is placed underneath and inside the loop of the carrying wire (20).

7. Web former as claimed in any of the claims 1 to 6, **characterized** in that, inside the loop of one of the wires (20), preferably of the carrying wire (20) that operates as the lower wire, in the area of the forming gap (G), the breast roll is a roll (21A) provided with a hollow face or with through perforations, in the interior of which roll, if necessary, a preferably relatively narrow suction zone (21a) is employed, which is placed substantially in the area of the forming gap (G) (Fig. 3).

8. Web former as claimed in any of the claims 1 to 7, **characterized** in that, as the speed of the web former, the speed of 1000...1700 m/min is used, and/or that the grammage is in the range of 50...100 g/m^2, and the flow rates in the headbox (60) are in the range of 200...300 l/s/m, and/or that the dry solids content of the web (W) before the first MB-unit (50;50A) is the range of 2...8 %.

9. Web former as claimed in any of the claims 1 to 8, **charact riz d** in that, in the position of the first forming roll, there is a group of forming rolls which comprises two forming rolls (14A, 24A), preferably suction rolls, which are arranged one above the other, and the covering wire (10) being separated from the web (W) after the latter forming roll (24A) in said group of forming rolls (Figs. 2 and 6).

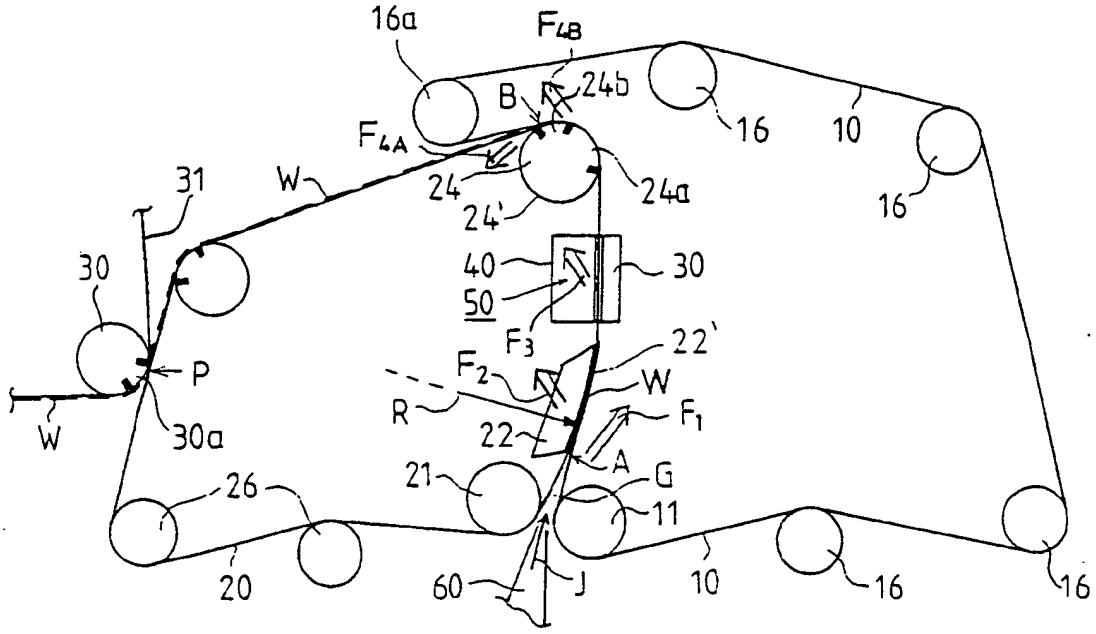
16a
F4B
B
24b
F4A
24
24'
24a
16
10
16
31
W
30
40
50
30
F3
22'
F2
W
P
R
F1
W
30a
22
A
21
G
26
11
20
60
J
10
16
16

FIG. 1

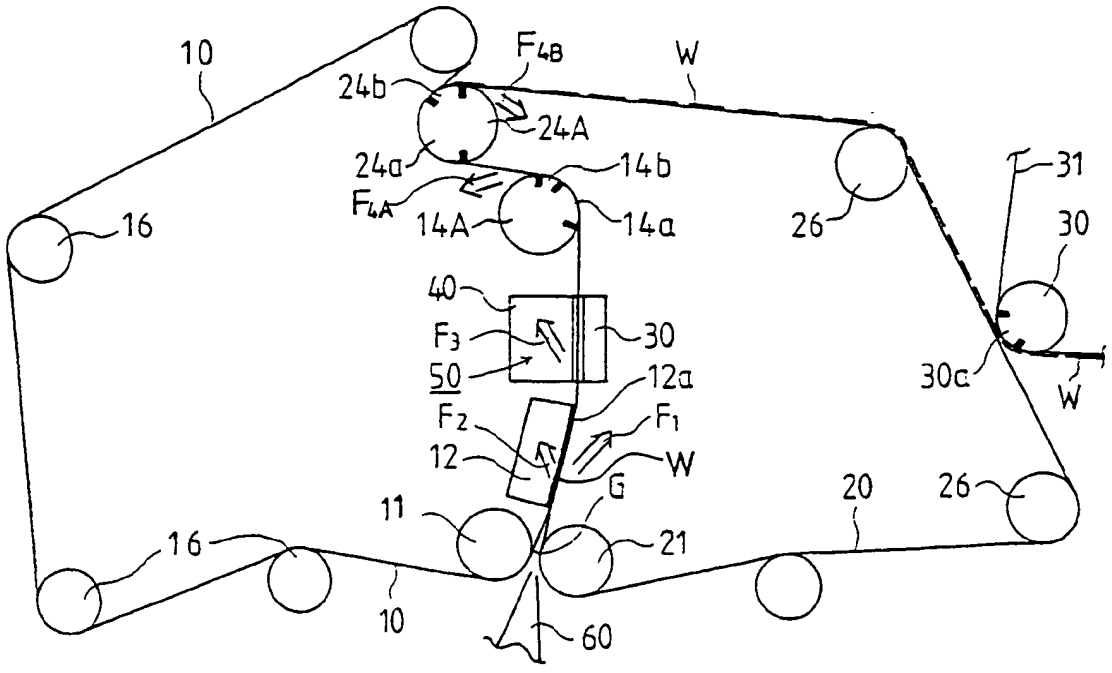
10
F4B
W
24b
24A
24a
14b
F4A
14A
14a
16
26
31
30
40
F3
30
50
12a
30a
W
F2
F1
12
W
G
11
21
20
26
16
10
60

FIG. 2

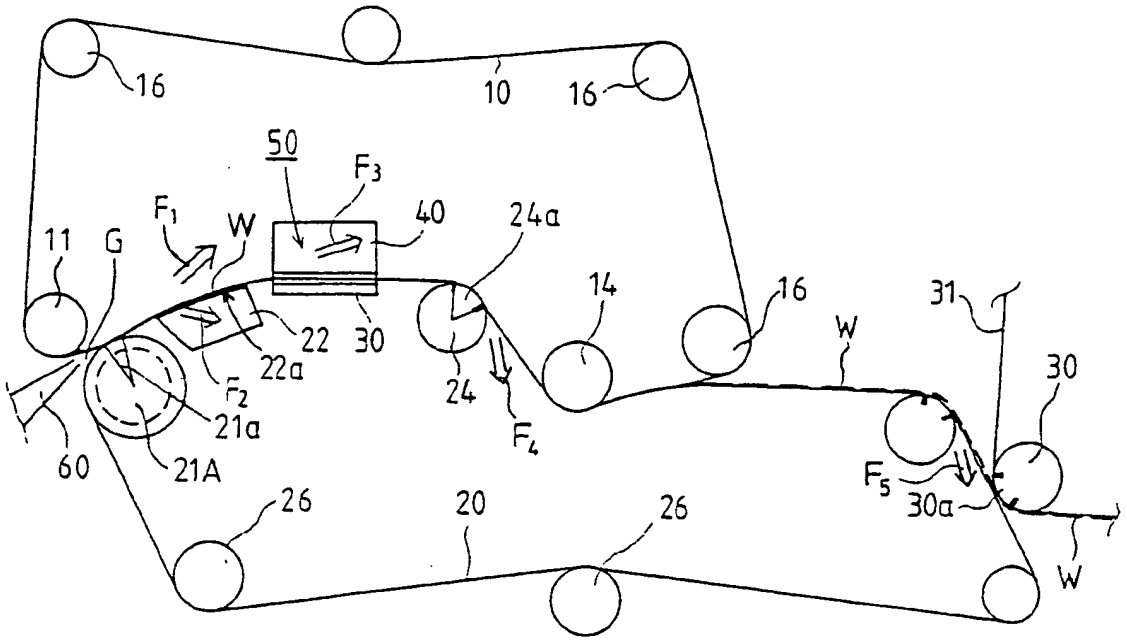
16
10
16
50
F3
F1
W
40
24a
11
G
14
16
31
W
22
30
22a
30
F2
24
21a
F4
60
21A
F5
30a
26
20
26
W

FIG. 3

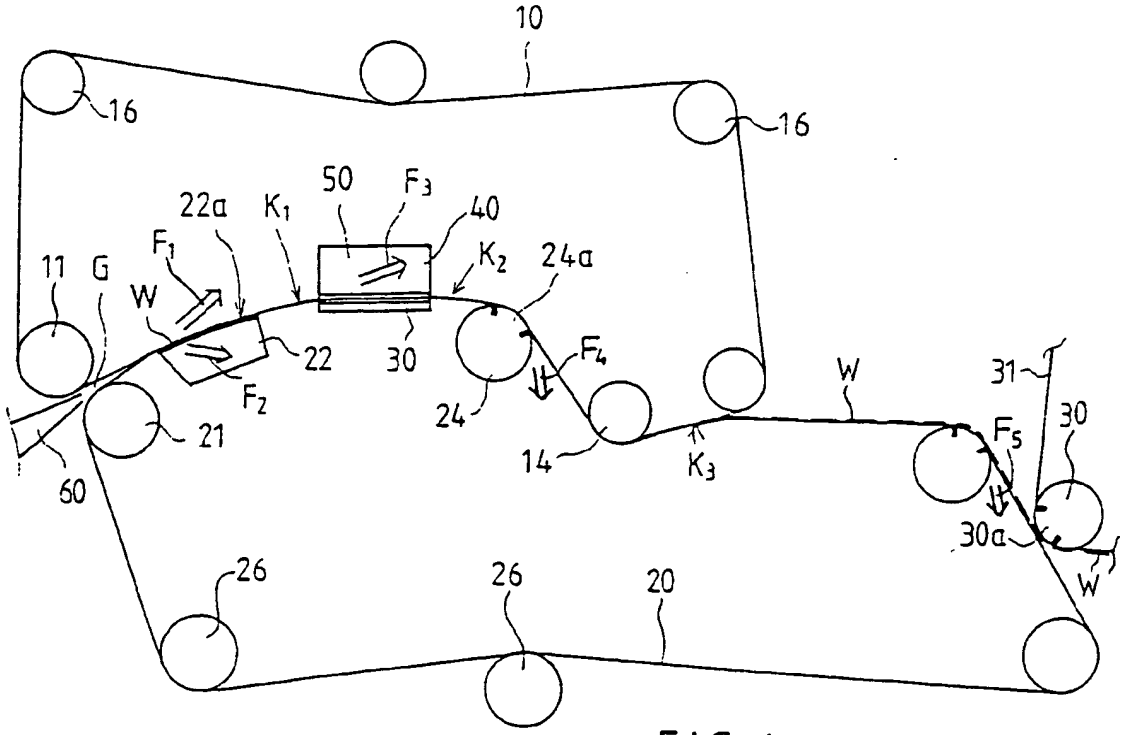
10
16
16
22a
K1
50
F3
40
F1
K2
24a
11
G
W
22
30
F4
W
31
F2
24
21
14
K3
F5
30
60
30a
26
26
20
W

FIG. 4

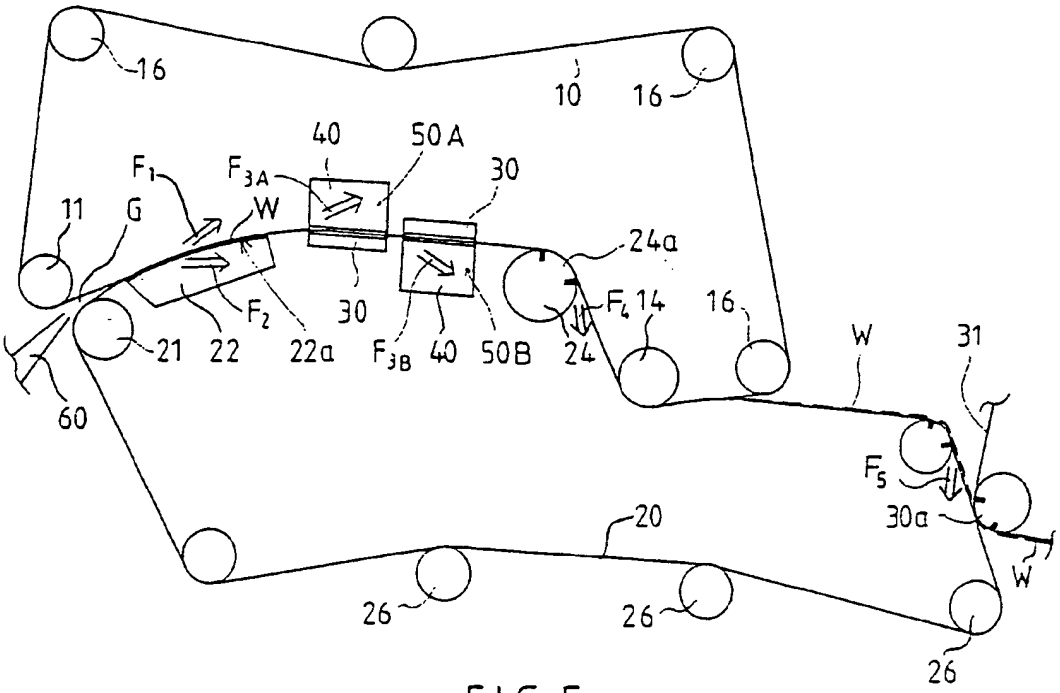
16
10
16
40
50A
30
F1
F3A
W
11
G
24a
F4
14
16
W
31
F2
21
22
22a
F3B
40
50B
24
60
F5
30a
20
W
26
26
26

FIG. 5

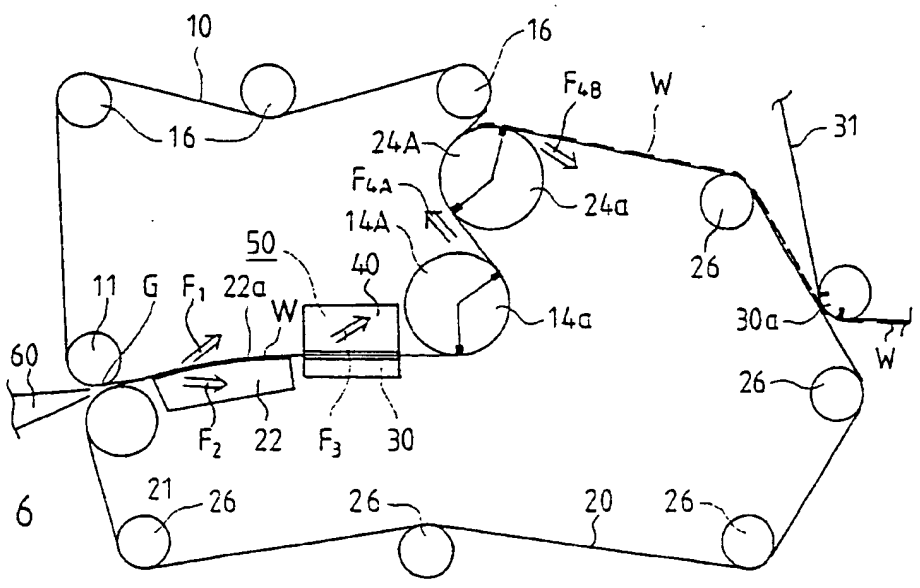
10
16
16
F4B
W
31
24A
F4A
24a
14A
50
40
26
11
G
F1
22a
W
14a
30a
60
W
26
F2
22
F3
30
21
26
26
20
26

FIG. 6

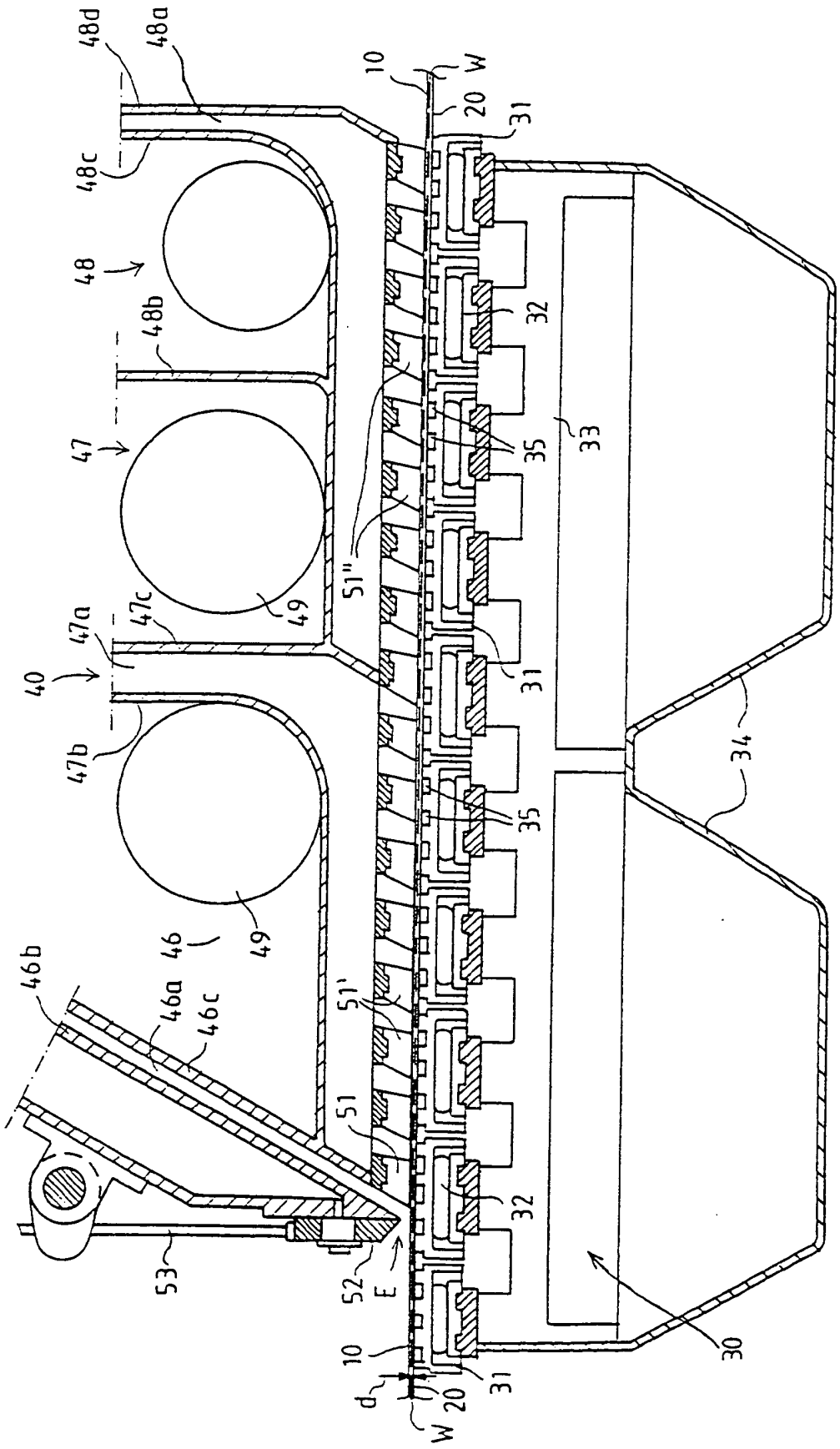
48d
48a
48c
48
48b
47
47a
47c
40
47b
49
46
46b
46a
46c
51
51'
51"
53
52
E
10
W
20
31
32
33
35
34
30
d

FIG.7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 85 0056

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 397 430 (VALMET-AHLSTROM) * the whole document *	1-3	D21F9/00 D21F1/48
X	WO-A-9 102 842 (VOITH) * the whole document *	1-3,7	
P,X	DE-U-9 105 797 (VOITH) * the whole document *	1-3,6,7	
P,A	EP-A-0 438 681 (SULZER-ESCHER WYSS) * the whole document *	1,3,7,9	
P,A	EP-A-0 454 989 (SULZER-ESCHER WYSS) * the whole document *	1,5	
A	WO-A-8 911 000 (VOITH) * the whole document *	1,2,9	
A	EP-A-0 373 133 (VALMET PAPER MACHINERY) * the whole document *	1,3	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

D21F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 JUNE 1992	DE RIJCK F.

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